

CLAIMS

1. A dimming device comprising a layered structure including a first layer and a second layer, such that a light reflectance of the first layer changes in response to an
5 external stimulation, wherein,

the first layer contains a first material whose optical characteristics change in accordance with a concentration of a specific element, and

the second layer contains a second material capable of
10 containing the specific element, the second material releasing or absorbing the specific element in accordance with the external stimulation.

2. The dimming device of claim 1, wherein the element is
15 hydrogen, and the first material is able to transition between a light reflecting state and a light transmitting state in accordance with a hydrogen concentration.

3. The dimming device of claim 2, wherein the first
20 layer diffuse-reflects light when the first material is in

the light reflecting state.

4. The dimming device of claim 3, wherein the first material is particles.

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5. The dimming device of claim 4, wherein a diameter of the particles is equal to or greater than 350 nm and equal to or less than a thickness of the first layer.

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6. The dimming device of claim 4 or 5, wherein the first layer contains colored particles having a visible light absorbing ability, the particles being adsorbed to the colored particles.

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7. The dimming device of any of claims 2 to 6, wherein the second layer contains a hydrogen storage material.

8. The dimming device of claim 7 operating in a region where respective hydrogen equilibrium pressure-composition isotherms (PTC characteristic curves) of the first layer and

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. the second layer are substantially flat.

9. The dimming device of claim 8, wherein, in the region where the PTC characteristic curves are substantially flat, 5 hydrogen equilibrium pressures of the first layer and the second layer are about the same.

10. The dimming device of claim 9, wherein a range of hydrogen storage amount of the second layer in the region 10 where the PTC characteristic curve is substantially flat encompasses a range of hydrogen storage amount of the first layer in the region where the PTC characteristic curve is substantially flat.

15 11. The dimming device of any of claims 1 to 10, wherein the second material releases or absorbs the specific element through exchanges of electrons.

12. The dimming device of any of claims 1 to 11, wherein 20 the second material releases or absorbs the specific element

in response to light irradiation.

13. The dimming device of claim 12, wherein the second layer contains a material having a photocatalytic ability.

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14. The dimming device of any of claims 1 to 13, comprising a pair of conductive layers for forming an electric field for causing ions of the specific element to move from the second material to the first material, or from
10 the first material to the second material.

15. The dimming device of claim 14, wherein the first and second layer are positioned between the pair of conductive layers.

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16. The dimming device of claim 14 or 15, wherein the first layer has conductivity, and functions as one of the pair of conductive layers.

20 17. The dimming device of claim 14 or 15, wherein the

second layer has conductivity, and functions as one of the pair of conductive layers.

18. The dimming device of any of claims 1 to 17, wherein
5 the second layer requires a light transmitting ability.

19. The dimming device of claim 18, wherein at least one of an upper face and a lower face of the first layer has bumps and dents, and the first layer transitions between a
10 state of diffuse-reflecting light and a state of transmitting light, further comprising a light absorbing layer for absorbing light having been transmitted through the first layer.

15 20. The dimming device of any of claims 1 to 17, wherein the second layer requires a visible light absorbing ability.

21. The dimming device of claim 20, wherein at least one of an upper face and a lower face of the first layer has
20 bumps and dents, and the first layer transitions between a

state of diffuse-reflecting light and a state of transmitting light, and

the second layer is disposed opposite from a light incident face of the first layer.

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22. The dimming device of any of claims 1 to 21, wherein at least one of the first layer and the second layer has a multi-layer structure.

10 23. A dimming device comprising a dimming layer whose light reflectance changes in response to an external stimulation, wherein,

the dimming layer contains a first material whose optical characteristics change in accordance with a concentration of a specific element, the first material being particles.

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24. The dimming device of claim 23, wherein the first material is able to transition between a light reflecting state and a light transmitting state in accordance with the

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concentration of the specific element.

25. The dimming device of claim 24, wherein the dimming layer diffuse-reflects light when the first material is in
5 the light reflecting state.

26. The dimming device of any of claims 23 to 25, wherein a diameter of the particles is equal to or greater than 350 nm and equal to or less than a thickness of the
10 dimming layer.

27. The dimming device of any of claims 23 to 26, wherein the dimming layer contains colored particles having a visible light absorbing ability, the particles being adsorbed
15 to the colored particles.

28. The dimming device of any of claims 23 to 27, wherein the specific element is hydrogen.

20 29. A dimming device comprising a dimming layer whose

light reflectance changes in response to an external stimulation, wherein the dimming layer

contains a first material whose optical characteristics change in accordance with a concentration of a specific
5 element, and

contains a second material capable of containing the specific element, the second material releasing or absorbing the specific element in accordance with the external stimulation, wherein
10 the first material is particles.

30. A display device including a plurality of pixels, each of the plurality of pixels having:

a first layer containing a first material whose optical
15 characteristics change in accordance with a concentration of a specific element;

a second layer containing a second material capable of containing the specific element, the second material releasing or absorbing the specific element upon application
20 of a voltage; and

a pair of electrodes for applying the voltage to the second layer,

wherein a light reflectance of the first layer changes in response to the voltage.

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31. The display device of claim 30, wherein the first material is able to transition between a light reflecting state and a light transmitting state in accordance with the concentration of the specific element.

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32. The display device of claim 31, wherein the first layer diffuse-reflects light when the first material is in a light reflecting state.

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33. The display device of claim 32, wherein the first material is particles.

34. The display device of claim 32 or 33, wherein at least one of an upper face and a lower face of the first layer has bumps and dents.

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35. The display device of claim 33, wherein the first layer further contains colored particles, the first material being adsorbed to the colored particles.

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36. The display device of any of claims 32 to 34, wherein the first layer transitions between a state of diffuse-reflecting light and a state of transmitting light, and the second layer requires a light transmitting ability,

10 further comprising a light absorbing layer for absorbing light having been transmitted through the first layer and the second layer.

37. The display device of any of claims 32 to 34,
15 wherein the first layer transitions between a state of diffuse-reflecting light and a state of transmitting light, the second layer having a visible light absorbing ability, and

the second layer is disposed opposite from a light
20 incident face of the first layer.

38. The display device of any of claims 30 to 36,
wherein the second layer is disposed on a light incident side
of the first layer, and functions as a color filter.

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39. The display device of any of claims 30 to 38,
wherein the specific element is hydrogen, and the second
layer contains a hydrogen storage material.

10 40. The display device of any of claims 30 to 39,
wherein the second material releases or absorbs the specific
element through exchanges of electrons.

41. The display device of any of claims 30 to 40,
15 wherein the first layer has conductivity, and functions as
one of the pair of electrodes.

42. The display device of any of claims 30 to 41 which
is a reflection type display device.

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43. The display device of claim 35 further comprising a backlight.

44. The display device of any of claims 30 to 33,
5 wherein the first layer transitions between a state of mirror-reflecting light and a state of transmitting light, further comprising a backlight.